EU-PolarNet
White Paper No. 4

The road to the desired states of social-ecological systems in the Polar Regions

Reindeer herd (Rangifer Tarandus) in Finnmark, Norway *(Photo: Lawrence Hislop)*

Background and Motivation

The future development of social-ecological systems of the Polar Regions depends on our ambition and capacity to meet changes and to navigate towards a sustainable future. Research can and must play an important role in this process. The sustainable development goals of the UN are useful guidelines in this, but their indicators are not always fully relevant in the Polar Regions. In order to be able to make the right decisions in the future development of social-ecological systems, this white paper addresses the most fundamental need for any societally relevant research for the Polar Regions: the identification of what the different Arctic and Antarctic stakeholders see as the desired future states of the Polar Regions and the assessment and proactive development of pathways that allow us to come as close as possible to reaching those desired states.

Life and societies are constantly in flux, and change needs to be accepted as a constant and also, as an opportunity. The changes taking place in the Polar Regions are not only of great consequence to people living and working there, but also to the entire global community – not least because of the role that the Polar Regions play in the regulation of the global climate system. These regions serve as the world's barometer for transformation caused by climate change and the way we respond to it.

The changes we are experiencing affect our pathways into the future. However, unless we proactively shape these pathways, the changes thrust upon those in the Polar Regions may not necessarily be positive ones. To enable positive change, we need to understand where the different stakeholders[1] want to be in the future, keeping in mind that resilient and sustainable ecosystems are needed to support these futures.

The research proposed within this theme aims to:

1. Identify the desired future states at different levels (local, regional, national etc.) envisioned by stakeholders in the Polar Regions;
2. Develop a suite of key polar indicators necessary to assess the state of the social-ecological systems in the Arctic and Antarctic; and
3. Provide guidance on optimal pathways towards the desired states ensuring just transitions.

Research addressing these three aims will also enable us to create guidelines for sustainable monitoring and regular assessments that allow us to assess our progress towards the desired states.

Heading out for seal hunting *(Photo: Lawrence Hislop)*

[1]Throughout the paper, we use the term stakeholder to describe anyone with an interest, concern or 'stake' in the Polar Regions, including communities, individuals, organisations, governments and other right-holders.

Kangaamiut, West-Greenland *(Photo: Peter Prokosch)*

To achieve the above, the research proposed takes into consideration the interests of decision-makers who want to have access to succinct, problem-focused/targeted (research) results and recommendations. This white paper builds on existing research, adding novel research as needed, with the overall goal of producing targeted and succinct summaries for decision-makers.

Due to the problem-focused approach required to deliver the research proposed in this white paper, the work is necessarily 'post-disciplinary', involving a range of different capacities and methods and with strong contributions from the natural and social sciences. A 'post-disciplinary' approach acknowledges that social phenomena transcend the boundaries of any conventional academic disciplinary inquiry and aims at assessing phenomena holistically and in an integrated fashion.

European governments are at a crossroads with regard to the future stability and sustainability of a strong and relevant European community, in relation to (a) climate-change preparation and mitigation, and (b) ensuring European and global security, not only in terms of a more conventional view of security as public safety but also water, food, energy, health and environmental security. These challenges are explicitly pertinent for the northern Arctic parts of Europe.

The Arctic and the Antarctic play a significant part in this – a little more than 4 million people live in the Arctic, with about 1.2 million people living in the European Arctic (excluding Russia). Fifteen European countries (12 within the EU, including the UK, plus Norway, Russia and Ukraine) are decision-making parties to the Antarctic Treaty System and have active National Antarctic Programmes of research. The EU countries of Sweden, Finland and Denmark are members of the Arctic Council, as are the European countries of Norway and Iceland. Climate-related changes are amplified in the Polar Regions, positioning the Polar Regions as a bellwether of global change, and proactive action is required to mitigate and minimize the impacts resulting from these changes. In the Arctic, the social-ecological systems are further pressured by social changes, e.g. related to migration, urbanization, and health-related issues.

The future of the Polar Regions is intricately entwined with the future of Europe (and the rest of the world), and without a better understanding of the perspectives of those most engaged with the Polar Regions, be it as the space where they live; in terms or renewable or non-renewable natural resources on Polar lands and in Polar marine environments; or through economic, environmental or political ties, we cannot positively affect, let alone shape, the decisions that will decide our common futures.

Furthermore, understanding the perspectives and values of all polar stakeholders offers an opportunity to optimize all policies and to avoid potential conflicts, which will ultimately reduce costs.

Finally, the current sustainable development agenda, primarily defined by the UN Sustainable Development Goals (UN SDGs), although global in reach and ambition, has not been designed with the Polar Regions in mind. As a result, UN SDGs, and their respective indicators, are not specific enough to give guidance

in all decisions made concerning Polar Regions. This white paper aims at filling this fundamental gap by suggesting a suite of polar indicators and by adapting the UN SDGs to suit the Polar Regions.

So far, we do not have a solid understanding of which desired states have been identified by the range of stakeholders in the Polar Regions. Without knowing the desired states, we cannot even begin to direct pathways towards achieving optimal health and functioning of the social-ecological systems taking into consideration the needs, values and perspectives of the different stakeholders. Until the currently implicit desired states are made explicit, conflict over the future of protection and utilisation will be inevitable. The rate of change in the Polar Regions and the variety of stressors already impacting them mean this dialogue is urgent.

In addition, while we are tasked with achieving the UN SDGs across the world, the poor fit of the related SDG indicators to the Polar Regions means that we are unable to effectively assess and track the pathways towards achieving the SDGs in the Polar Regions. There is a dire need for a suite of polar indicators that allow us to cross-reference to the SDGs while having an appropriate tools to monitor change in the Polar Regions. Developing such a suite of polar indicators will necessarily inform work on a post-2030 development agenda.

Not committing to the activities outlined in this white paper means that we may miss a unique opportunity to be prepared for the future in the Polar Regions, to build an informed post-2030 development agenda and to link the SDGs to developments and change in the Polar Regions.

Now, we are also in a position to build on, integrate and expand existing knowledge regarding different stakeholder values and needs, which has been developed over the last decade.

Societal Relevance

The research proposed in this white paper has direct links to and contributes to issues involving governance in the Polar Regions as it will clarify the range of interests, perspectives and values of different stakeholders, including policy-makers. Thus, it will allow a more targeted approach towards sustainable development and resilience in the Arctic, and to effective integrated environmental management and informed decision-making in the Antarctic. The research proposed will ensure that ecosystem services are being valued and considered in decision-making.

The proposed research assists in the co-production of knowledge and the co-determination of desired futures for the Arctic and Antarctic. In the Arctic, this work will improve disaster preparedness and address food, water and energy security, sustainable economic development and the improvement of available hard and soft infrastructure.

Furthermore, the proposed research has integral components related to climate justice, equity and fair access to services, especially as the identification of desired states and the transition towards those desired states are concerned.

The research suggested in this white paper will contribute to making the SDGs and their indicators relevant for the Polar Regions (which is likely to also benefit other areas, such as high mountain regions), thereby contributing to capacity building and education among polar stakeholders, specifically including Arctic communities and indigenous right-holders.

Finally, the proposed research offers governments and governmental bodies, including the European Union and its member states, a framework of advice in developing their Arctic and Antarctic policies.

Remnants of a village, Siberia *(Photo: Peter Prokosch)*

Research Needs

While there are obvious similarities between both Polar Regions, they differ from each other in many important respects. Many of these differences – such as the absence of permanent local or indigenous communities in the Antarctic and differences in type and severity of historic environmental impacts – influence the potential pathways toward the desired states. Furthermore, the causes of change, and the type and extent of change, differ between both Polar Regions. Consequently, there may be regionally different desired states and different sets of suitable governance actions.

To clarify the desired states in the Antarctic, it is important to connect the research strongly with the history of Antarctic sovereignty and the Antarctic Treaty System (see Box 1 for further information). Several components of the governance system frame the research on the desired states for the Antarctic. These include (a) the designation of Antarctica as a natural reserve devoted to peace and science, (b) the explicit recognition that certain values (including intrinsic and wilderness values) should/do apply to the Antarctic, (c) the General Principles of Antarctic Tourism, adopted by the ATCM in 2009, and (d) the importance of certain principles, such as the precautionary principle in managing human activities in the Antarctic.

In the process of identifying and agreeing on the desired states in the Arctic, we need to acknowledge and understand an even wider community of stakeholders. The Arctic consists of eight Arctic countries and more than 40 different Arctic Indigenous Peoples. It is experiencing increasing interest from around the world – from researchers, environmental protection groups, tourists, and businesses interested in hydrocarbon and mineral exploration, fisheries, the transport industry, telecommunications, etc. This is reflected by an increasing number of states and organizations that are currently, or wish to become, observers to the Arctic Council. All of these people and organizations have different interests in the Arctic, and their desired future states have many possible conflicting facets.

It is also important to acknowledge the rapid changes that occur in the Arctic, which can dramatically affect people's lives and ecosystems. Climate change is a major concern, which is compounded by rapid economic developments and social and cultural transformations.

The Arctic Council plays an important role in facilitating cooperation in the Arctic. The Arctic Council is committed not only to maintaining peace, stability, and constructive cooperation in the Arctic but also to the wellbeing of Arctic inhabitants, sustainable development and the protection of the Arctic environment.

As the Arctic is not homogenous, there are likely to be significant differences in the desired states envisaged by the eight Arctic Council member states and the Council's six permanent participants who represent the Arctic's indigenous peoples.

A thorough understanding of these different desired states both in the Arctic as in the Antarctic should form the basis for the roads to be taken towards the future of the Polar Regions.

Box 1: Background on Antarctic sovereignty claims and the Antarctic Treaty System

As no international consensus could be reached on the territorial claims in Antarctica during the first half of the 20th century, the region became a subject of a unique international governance system. Twelve EU Member States (including the UK) are among the 29 Consultative Parties that take decisions on the governance of the Antarctic at the annual Antarctic Treaty Consultative Meetings (ATCMs). Several EU Member States are also Contracting Parties to the Convention on the Conservation of Antarctic Marine Living Resources and Members of the Commission under this convention.

The discussions at the ATCMs over the last decades have shown that countries involved in Antarctic governance, as well as stakeholders (e.g., environmental conservation groups, tourism operators, etc.), have different ideas about what precisely agreements achieve within the Antarctic Treaty System should mean with respect to regulating and managing change in the Antarctic. Consequently, these stakeholders may have different perspectives on the question, to what extent changes are desirable, and whether governance action is needed? Furthermore, for all involved countries and stakeholders, there may be many different other sources and motivations that may inform 'their' views on what a desired state in the Antarctic should mean. Examples include economic interests, good relationships with other countries or stakeholders, lack of knowledge, etc.

Gaps in knowledge & research needs

Gaps in knowledge relate to the components of the desired states of the social-ecological systems in the Polar Regions, as well as to the type and extent of climatic changes as well as changes in human activity in these regions. This also implies gaps in knowledge in relation to action that would be needed to ensure that developments will move in the direction of the desired states. Even when we have increased knowledge of the desired direction of governance, we still need to understand which instruments (governmental, intergovernmental, self-regulatory, and other instruments, or a mix thereof) offer the best chance of success.

To address those gaps in knowledge, we will need to

1. Identify the desired future states envisioned by stakeholders and 'right–holders' for the Polar Regions (Subtopic 1);
2. Develop a suite of polar indicators necessary to assess the state of the social-ecological systems in the Arctic and Antarctic (Subtopic 2);
3. Create guidelines for sustainable monitoring and regular assessments that enable us to assess our progress towards the desired states (Subtopic 2); and
4. Provide guidance on optimal pathways towards the desired states ensuring a just transition (Subtopic 3).

The three subtopics for the research proposed are described in greater detail below.

Subtopic 1: Desired States

A desired state (see Figure 1) is an integrated value-based concept of ideal futures for different stakeholders that is holistic in nature and captures all research disciplines, indigenous peoples' knowledge and stakeholders' input. Different "desired states" are possible at different levels (local, regional, national and international, and depending on the different stakeholders consulted). Mapping desired states involves identifying and understanding the different stakeholders' perspectives, interests, values and motivations.

The concept of desired states is a truly post-disciplinary concept that draws together knowledge and research from the social sciences and natural sciences. The latter need to provide insights that allow us to understand the structure and characteristics of polar ecosystems over the next decades. Without better projections of environmental change and social pressures (ideally delivered by coupled-system models at regional and global scales), we do not know which species will survive in the Polar Regions and which will invade them, and how those changes will impact sustainable livelihoods in the Arctic and effective ecosystem-based management of the marine and terrestrial environments in the Antarctic.

Knowledge about the desired states and a better understanding of where stakeholders see themselves in the future, will enable governments to optimize policies and avoid potential conflicts, which in turn will result in cost savings, in particular as transaction costs are concerned. It will also contribute to a more re-

The road to the desired state of the social-ecological systems

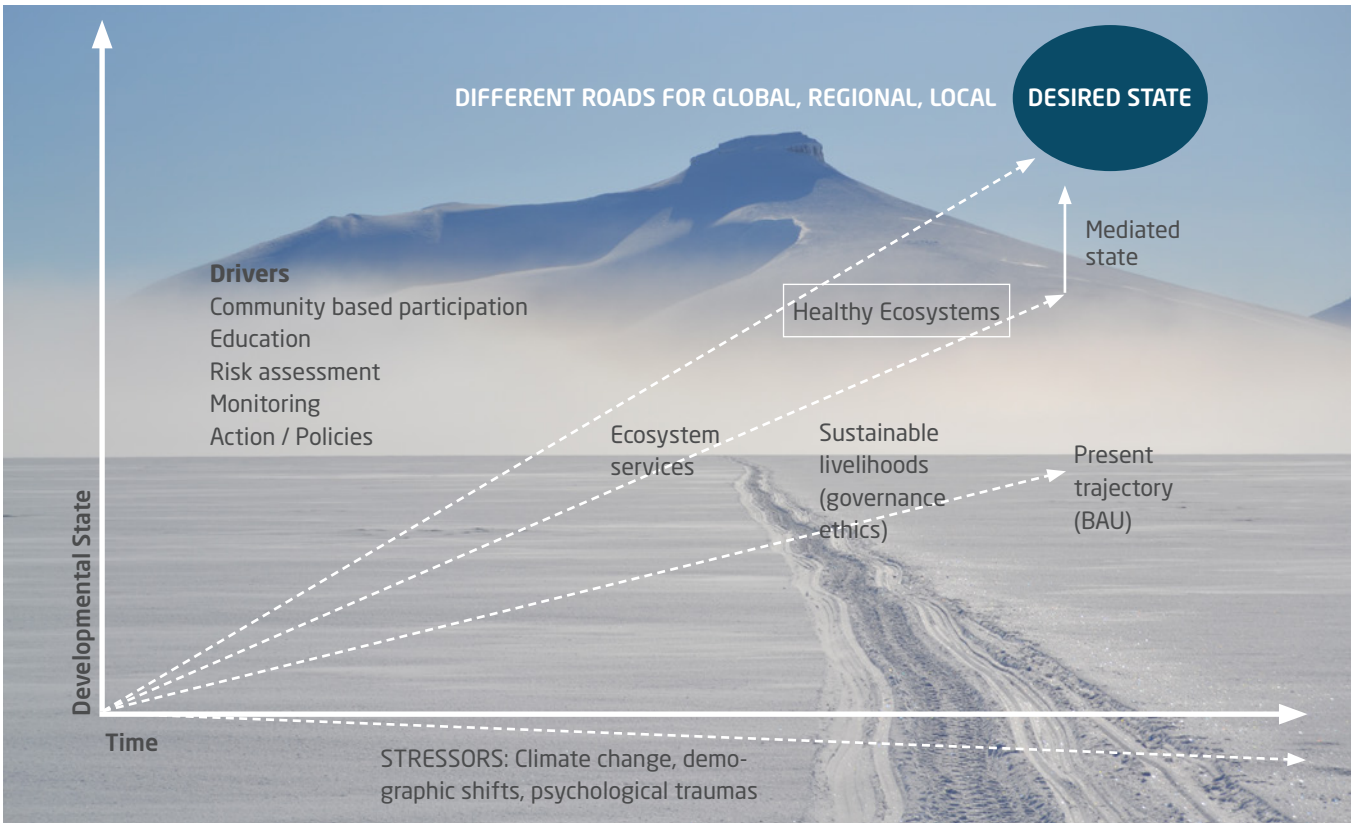

Fig.1: Pathways to the desired states of social-ecological systems

alistic and advanced understanding of future changes and the response they demand.

A desired state may not necessarily be very different from what we have today, i.e. not everything needs to change to achieve the greater common good.

To reach the desired states we need to harvest the best available knowledge of the already existing work and to develop tools of how we use this in order to get to a higher level. Communication and education are some of the tools used in this framework to facilitate pulling together existing research and involving the wider research and stakeholder communities.

Subtopic 2: Assessments for healthy polar social-ecological systems

In 2015, the global community adopted Agenda 2030 for sustainable development and set 17 goals to guide global efforts in that direction. There have been concerted efforts toward a concretization of the SDGs through the identification of targets and indicators -- a global indicator framework developed comprises 232 individual indicators. However, this framework largely overlooks the Polar Regions, creating a lack of tools by which we can measure progress towards achieving the SDGs in the Polar Regions.

There is a particular lack of indicators that measure the state of the Arctic and Antarctic social-ecological systems. For instance, the present SDG indicators do not include a single indicator focused on the cultural wellbeing or retention of ancestral languages (the only indicators that partly refer to culture are 4.7.1 on the global citizenship education and 11.4.1 on the total expenditure per capita spent on the cultural and natural heritage). These cultural assets are, however, of existential value to the indigenous peoples and communities in the Arctic. Similarly, the economic indicators associated with the SDGs do not recognize the importance of a mixed economy or any lifestyles that are (partially) based on subsistence, and the only indicators (10.7.1 and 10.7.2) on migration do not offer any information on the rapidly changing situation in the North, or on how fast population and demographic shifts affect the lives of people in the Arctic.

In order to understand the developments in both Polar Regions, while taking their multi-level connectivity with global trends and changes into consideration, it is imperative to construct a set of polar indicators that are representative of the Arctic and Antarctic. Although some of these polar indicators would be applicable and relevant to both Polar Regions, some of them need to remain distinct in recognition of differences between the two regions that we have already touched on in the previous section.

The state and changes in the Polar Regions are to a large extent driven by compound processes related to climate change, and indicators to track and assess change in the biophysical environment need to be developed and reviewed on a regular basis. At the same time, we also need to take into consideration other anthropogenic impacts on the polar environments as well as rapid changes in people's lives in the North, and in the scale and scope of human engagement with the Antarctic. People's lives in the Arctic, and many facets of human interactions with the Antarctic, are tightly connected to nature and rely on it for survival, health and cultural, mental and social wellbeing. Polar indicators need to be able to properly reflect and account for those vital social-ecological interactions.

Some work, mostly in an Arctic context, has already been carried out to date that would aid the development of such indicators. For example, a suite of Arctic Social Indicators were proposed by the Arctic Council Sustainable Development Working Group, and a current project funded by the US National Oceanic and Atmospheric Administration looks into possibilities for defining relevant indicators to assess biophysical changes in the Arctic. Yet, those initiatives represent fragmented and disconnected efforts – not a comprehensive and integrated suite of polar indicators that will have to include relevant elements from the biophysical, socio-cultural, and politico-economic environments as well as account for their very often coupled nature.

Such a suite of indicators will necessarily have to be co-produced by experts and stakeholders, including indigenous representatives, and will have to be validated with local communities in the Arctic and Antarctic stakeholders as feasible and required.

Sustainable Monitoring

Indicators are only useful if the relevant information is collected on a sustained, i.e. long-term, basis. This has been a problem for many small-scale research projects, as they typically do not concern themselves with the sustained collection of information beyond the project's duration. This was also a problem with the Millennium Development Goals, where 46% of the data needed were not available for reporting at the end of 2015, and the challenge is apparent for the present UNECE member countries with regard to their ability to produce data in support of SDG indicators. When selecting appropriate indicators, it is necessary to compare the amount of data already provided (and their potential use for assessing progress) with the cost of creating the necessary soft infrastructure to collect the relevant data.

In summary, there is an urgent need not only to develop a set of accurate and relevant indicators for the Polar Regions but also to ensure that monitoring, i.e. the collection of data for those indicators, is feasible and, most of all, sustainable to enable us to observe changes in the complex polar social-ecological systems on a long-term basis. Further:

- whenever possible, data and information should be collected by local stakeholders and indigenous people without creating any additional burden or pressure for them;
- in uninhabited regions that are difficult to access (including many marine areas) or in areas with limited seasonal access (certain terrestrial areas in winter), data collection will need to be strengthened[2]; and
- the use of new technologies (e.g., remote sensing, improved connectivity, phone apps) can support data collection by local stakeholders as well as remotely.

The data collected for a suite of polar indicators would also serve as the basis for *One Health Assessments* for the Polar Regions.

[2]However, we should not lose sight of the costs vs. benefits of strengthening data collection in those regions. It may be prohibitively costly to collect data in remote and uninhabited regions, and we should keep in mind that significant benefits could be derived by strengthening data collection in other regions for a much lower cost.

One Health Assessments

To comprehend and effectively support positive developments in the Arctic and Antarctic (in the Antarctic, such positive developments will be primarily directed at the conservation of the Antarctic environment), a new approach is needed. This new approach involves a comprehensive and integrated assessment of polar social-ecological systems that recognizes the interwoven nature of human activities and socio-cultural systems with the biophysical environment. It is no longer sufficient to treat those as separate systems; they form comprehensively integrated components of the social-ecological system and the health of each of this system's components affects the overall system health – hence, the need of a One Health Assessment (From 2015 to 2017, the One Health Assessment approach has already been successfully tested in the Arctic Council's One Health project).

Existing systematic assessments – for example, risk assessments, environmental impact assessments and social impact assessments – are well recognized and established methods for evaluating states of environment, society or various economic developments. However, none of these existing assessments takes a holistic approach to the overall health of social-ecological systems, which we see as a precondition for reaching the desired states for any community or stakeholder group.

There is a critical need for the development of a new approach to assess social-ecological systems, and the One Health Assessment is such an approach. Its advantage lies in drawing on previously conducted work and frameworks, such as the Arctic Social Indicators framework, UN Happiness Index or UN food security indicators. For the Polar Regions, a One Health Assessment would rely on polar indicators developed within the research proposed in this white paper. However, the application of a One Health methodology has much broader relevance and could be adopted for many other regions – both within the European Union as well as beyond it, informing development work carried out in other parts of the world.

Subtopic 3: Just transition

It is important to turn inevitable changes (see Box 2) into pathways, or 'just transitions', by controlling and directing them to aid our progression towards a desired state. There are different types of changes, each necessitating differentiated strategies and techniques, to affect and utilize them most effectively and efficiently. We may wish to channel our efforts towards the prevention of certain changes, while we may wish to redirect others. Those major changes that cannot be prevented or sufficiently steered in a foreseeable timeframe (e.g., climate change) require adaptation and resilience if we are to approach desired future states.

Environmental management in the Polar Regions has had to grapple with economic development in the Arctic and been affected by changing dynamics in the Antarctic regime, primarily resulting from growing membership to the Antarctic Treaty System and the increasingly different interests of member states.

Box 2: Changes in the Polar Regions

- Climate change;
- Changes in our knowledge about climate change and possible consequences;
- Changes in the terrestrial and marine ecosystems (e.g., increase of non-native species, changes due to climate change or pollution, etc.)
- Changes in desires of state governments and stakeholders regarding the use of natural resources in the Arctic or Antarctic;
- Direct and indirect changes in the governance system, such as the increase of Contracting Parties to the Antarctic Treaty, or the increase of observers to the Arctic Council;
- Changes in other international governance systems, or changing international relations between state governments, that may influence governance in the Polar Regions, such as developments in the frameworks of UNCLOS, the Convention on Biological Diversity, developments in the Arctic Council;
- Changes in the scale and character of habitation in the Polar Regions (such as the number of research stations, the type and volume of infrastructure to support research, demographic shifts and economic development in the Arctic); or
- Socio-cultural changes.

Polar governance and management to date has not taken us on a road to a balanced and healthy social-ecological system; on the contrary, several problems have occurred. There is now an urgent need to rebuild the foundations upon which development and nature conservation in the Arctic and nature conservation in the Antarctic rest, and this will require a greater acknowledgement of the delicate balance and interwoven character of socio-ecological systems and will require partnerships with a strong focus on justice, ethics and moral choices. This aim echoes objectives outlined in White Paper WP no 2. Different stakeholders have different moral and ethical foundations and may have a different take on what justice and fairness imply. It is important to consider different stakeholders' needs and their differing perceptions of what 'just transitions' towards desired states means. Implicit assumptions, perspectives and convictions need to be made more explicit to enable a balanced and just transition towards the future.

Just transition can mean:

- Preventing undesirable change that would constitute a risk for the desired state(s);
- Steering change towards the desired state(s); or
- Adapting to change that cannot be preventing or steered (e.g. climate change) towards the desired state(s).

In any case, the hallmark of just transition is that it recognises and accommodates the needs of local stakeholders (in the Arctic, importantly the local inhabitants) and ecosystems (in the Antarctic, environmental health and protection are paramount), which embraces not only the final outcome but also the process itself, including specific responsibilities and changes.

A just transition has different parameters for the Arctic and the Antarctic. While the latter has a stronger emphasis on preserving the Antarctic environment through a system of international agreements, Arctic transitions have to take into consideration the complexity of different Arctic regions and their populations. In the Arctic, not only are there different value bases, there are also varying moral, political and socio-economic subsystems which will require nuanced and targeted transitions towards the desired states. One key challenge is to mediate these differences and, at the same time, not to lose direction. There is a need to further improve the definition of 'just' steps and how to evaluate them is of essence in this subtopic.

The research that is needed to support a just transition includes increased knowledge of changing ecosystems in the past and in the present. Monitoring, risk assessments, predictions, modelling, and new technology are all essential tools. It is also important to identify what "just" steps can be taken to reach the desired states and how it can be ensured that the entire transition process remains as fair as possible. Here, it may be imperative to take a community-based approach where bottom-up initiatives play prominent roles. Moreover, researchers need to develop new forms of collaboration where disciplinary approaches are still valuable, but transformed into capacities that are needed for navigating the possible pathways towards the desired states in truly post-disciplinary fashion.

Relevant Cooperation Partners

All stakeholders in the Arctic and Antarctic need to be included in this research as it must draw fundamentally on their perspectives, motivations and values to identify not only the desired states but also the optimal pathways towards those desired states. Monitoring and risk assessments also depend on input from those stakeholders. The research needed should be truly collaborative and aiming at the co-production of knowledge by the researchers involved and other stakeholders.

Subtopic	Key stakeholder groups (other than researchers)	Reasoning (position, influence, impacts, etc.)
Desired States	Parliamentary and policy partners, incl. Arctic Council and non-polar states (Arctic & Antarctic)	Directly involved and necessary (decision bodies)
	Local and indigenous communities, citizens (Arctic)	Directly involved and necessary (decision bodies)
	International networks and agencies (including NGOs, business and regional networks)	Needed for positive outcome
	Polar organizations, including COMNAP, SCAR, IASC, IASSA, UARCTIC, ATCM, CCAMLR, CEP and Arctic Economic Council (Arctic and Antarctic)	Policy function and know-how
	Media (Arctic and Antarctic)	Outreach and communication capacity
	Business and Industry sectors (Arctic and Antarctic)	Economic interest, significant impacts
Assessments for healthy polar social-ecological systems	Parliamentary and policy partners, incl. Arctic Council and non-Polar states (Arctic & Antarctic)	Directly involved
	Local and indigenous communities, citizens (Arctic)	Directly involved
	Polar organizations, including COMNAP, SCAR, IASC, IASSA, UARCTIC, ATCM, CCAMLR, CEP and Arctic Economic Council (Arctic and Antarctic)	Policy function and know-how
	Business and Industry sectors (Arctic and Antarctic)	Economic interest, significant impacts
Just transition	Parliamentary and policy partners, incl. Arctic Council and non-Polar states (Arctic & Antarctic)	Directly involved
	Local and indigenous communities, citizens (Arctic)	Directly involved
	Polar organizations, including COMNAP, SCAR, IASC, IASSA, UARCTIC, ATCM, CCAMLR, CEP and Arctic Economic Council (Arctic and Antarctic)	Policy function and know-how
	Business and Industry sectors (Arctic and Antarctic)	Economic interests, significant impacts

4-Wheeler, a way of transport in the road-less tundra in summer for Inuit in Pond Inlet, Canada *(Photo: Peter Prokosch)*

Enabling Capacities and Resources

The focus of this white paper is to enable a concrete contribution to the work of the European Union in its relationship to the Arctic Council and the Antarctic Treaty System. Moreover, the Social, Economy and Culture Expert Group (SECEG) of the Arctic Council gives the Sustainable Development Goals top priority, as do ongoing Horizon 2020 funded Polar projects (INTAROS, NUNATARYUK).

For survey, coordinating, and synergy purposes it is important to establish firm platforms at and between the European universities engaged in Polar research. One such initiative is Arctic Five that includes the universities in Umeå and Luleå (Sweden), Oulu and Rovaniemi (Finland) and Tromsø (Norway) in an effort to improve the Arctic sustainable development research.

Communication and research coordination are essential (including communication between researchers and decision-makers at local, national and international levels) to effectively navigate the roads towards the desired states. There is a risk of losing direction if important stakeholders are disconnected, or if they do not understand each other.

Sustained and adaptable capacity-building amongst stakeholders to facilitate the co-production of knowledge is equally important for a just transition. Furthermore, education and outreach to the wider public require constant development, utilizing new technologies and interactive platforms that can support knowledge sharing and dissemination, collaborative scenario development, and strategic planning. The ambition is to provide free and readily available access to indicator databases and platforms that enable us to share indicators, related indicator datasets, community-based survey results and innovative research approaches. There is a need to adopt existing information systems to meet the specific needs for facilitating and tracking the transition towards the desired states.

Funding and international cooperation

International collaboration is essential for this work, not merely because the Arctic extends beyond Europe and human engagement in the Antarctic involves numerous countries and stakeholders from South America, North America, and Australasia, but also because this work builds on existing research on Arctic and Antarctic issues. To make the most of existing expertise and capacity across the world, we need to reach out to the international community and we need to connect with all stakeholders, including:

- Arctic and Antarctic collaborators,
- IASC member states,
- NAPs and ATCPs,
- Tertiary and research institutions and their networks, and
- Indigenous Peoples (to enable the co-production of knowledge).

Due to its strong focus on knowledge co-production, the work proposed will recognize the existence of different values for protection of the Antarctic (intrinsic and wilderness values) and sustainable use and development of the Arctic, where the research will also acknowledge differentiated societal rights that include, but go beyond, basic human rights and explicitly include indigenous rights.

Way Forward and Key Action Areas

First of all, it is advisable to set aside seed money for pilot studies to develop the overall approach described in this white paper, or elements of it (i.e. identification of desired states, indicator development, and One Health Assessment).

Further, in order to facilitate the co-production of knowledge in the Arctic, funding is required to enable stakeholders to be assembled so they can contribute to the identification of desired

Diving for marine observations in Antarctica *(Photo: CNRS/Michel Calzas)*

states and pathways towards these states. Without funding for this initial work, the participation of those local stakeholders cannot be guaranteed, and the wider research community and stakeholders cannot be adequately engaged and consulted. In the end, to undertake the main part of the research, larger consortiums of researchers and stakeholders/rights-holders will be required, and specific efforts will be needed to assemble these into cohesive research communities.

Regarding the SDGs' indicators for the Polar Regions important and initial tasks include:

- examination of the existing SDGs indicators' framework and seeing what indicators of it, if any, apply to the Arctic/Antarctic/or both;
- examination of what other indicators for the Polar Regions have been used/proposed in social science projects (e.g. Arctic Social Indicators, Arctic Human Development Report, ECONOR), it will be equally essential to reach out to natural scientists and representatives of indigenous and local communities to have their input at this stage already;
- estimation of how much data for the indicators we currently use is collected, even if this data is stored in various forms, locations and institutions; such information could be a great starting point to show where in fact we are standing when it comes to present knowledge about Polar SES .

Finally, it is important to establish a relationship with non-Polar partners involved in the work with the implementation of Agenda 2030, and specifically the SDG indicators. We are convinced that our efforts will add significant value to the general process.

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